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PROCEEDINGS.

Eight hundred and fifty-ninth Meeting.

May 10, 1893. — ANNUAL MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read the following letters: from the Central Physical Observatory, St. Petersburg, announcing the celebration of the twenty-fifth anniversary of the Directorship of H. Wild, on the 10th of May; from C. de Candolle, announcing the death of his father, Alphonse de Candolle, a Foreign Honorary Member of the Academy, who died at Geneva on the 4th of April, in the eighty-seventh year of his age; from the Natural History Society of Rhineland, Westphalia, and Osnabrück, inviting the Academy to attend its fiftieth anniversary on the 24th of May; from the Physical-Mathematical Section of the University of Kasan, announcing its intention to establish a prize in the name of Lobatcheffsky for researches in mathematics, or to place a bust in the building of the University, and soliciting subscriptions; from the Smithsonian Institution, transmitting a circular relating to the Hodgkins Prize; and from Samuel Cabot, John Elliott Pillsbury, and John Henry Wright, accepting membership in the Academy.

The Corresponding Secretary presented the Report of the Council.

The reports of the Treasurer and the Librarian were read and accepted.

The following report was read: —

Report of the Rumford Committee.

The Committee, at its first meeting, October 28, 1892, appointed John Trowbridge, Chairman, and B. O. Peirce, Secretary.

Five meetings were held during the winter.

On November 11, 1892, the Committee recommended a grant of $250 to D. W. Shea of the Illinois University for the continuation of an investigation on light.

On December 2, 1892, it recommended a grant of $200 to B. O. Peirce for investigation on the propagation of heat; and a grant of $250 to H. A. Rowland of Johns Hopkins University for work on the solar spectrum and metallic spectra.

On January 11, 1893, the Committee voted to recommend to the Academy to replace a defective medal now in the possession of Alvan G. Clark by a perfect one of full weight. It was also voted to recommend to the Academy to give a bronze copy of the Rumford Medal to the Rumford Historical Society of Woburn, Massachusetts.

The merits of several possible candidates for the Rumford Medal have been considered during the year; but no award has been voted.

For the Committee,
JOHN TROWBRIDGE.

May 10, 1893.

In accordance with the recommendation of the Rumford Committee, it was

Voted, To appropriate two hundred and fifty dollars ($250) from the income of the Rumford Fund to H. A. Rowland of Johns Hopkins University for work on the solar spectrum and metallic spectra.

Voted, To refer the matters of replacing the defective medal in the possession of Alvan G. Clark, and of the presentation of a bronze copy of the Rumford Medal to the Rumford Historical Society, to the Rumford Committee, with full power.

On the recommendation of the Committee of Finance, it was

Voted, To make the following appropriations from the income of the general fund: —

For the library	$1,500
For publications	2,500
For the expenses of meetings . . .	200

On the motion of the Treasurer, it was

Voted, That the assessment for the ensuing year be five dollars.

The Committee on the proposed alteration of the Statutes presented a report, and it was

Voted, To amend the first section of Chapter VIII. of the Statutes by striking out the words, "to be held in the Hall of the Academy, in Boston." The section, as amended, reads as follows: —

> "1. There shall be annually four stated meetings of the Academy; namely, on the second Wednesday in May (the Annual Meeting), on the second Wednesday in October, on the second Wednesday in January, and on the second Wednesday in March. At these meetings only, or at meetings adjourned from these and regularly notified, shall appropriations of money be made, or alterations of the statutes or standing votes of the Academy be effected."

The following gentlemen were elected members of the Academy: —

Sylvester Rosa Koehler, of Boston, to be a Resident Fellow in Class III., Section 4.

Frederick Remsen Hutton, of New York, to be an Associate Fellow in Class I., Section 4, in place of the late William P. Trowbridge.

Grove Karl Gilbert, of Washington, to be an Associate Fellow in Class II., Section 1, in place of the late John S. Newberry.

Friedrich August Kekulé, of Bonn, to be a Foreign Honorary Member in Class I., Section 3, in place of the late August W. von Hofmann

Maurice Lévy, of Paris, to be a Foreign Honorary Member in Class I., Section 4, in place of the late Marquis de Caligny.

Ludimar Hermann, of Königsberg, to be a Foreign Honorary Member in Class II., Section 3, in place of the late Sir Richard Owen.

Sir Joseph Lister, Bart., of London, to be a Foreign Honorary Member in Class II., Section 4, in place of the late Sir William Bowman, Bart.

James Bryce, of Oxford, to be a Foreign Honorary Member in Class III., Section 3, in place of the late Alfred, Lord Tennyson.

The annual election resulted in the choice of the following officers: —

JOSIAH P. COOKE, *President.*
AUGUSTUS LOWELL, *Vice-President.*
CHARLES L. JACKSON, *Corresponding Secretary.*
WILLIAM WATSON, *Recording Secretary.*
ELIOT C. CLARKE, *Treasurer.*
HENRY W. HAYNES, *Librarian.*

Councillors.

CHARLES R. CROSS,
WILLIAM R. LIVERMORE, } of Class I.
BENJAMIN O. PEIRCE,

HENRY P. WALCOTT,
BENJAMIN L. ROBINSON, } of Class II.
HENRY W. WILLIAMS,

LUCIEN CARR,
BARRETT WENDELL, } of Class III.
CRAWFORD H. TOY,

Rumford Committee.

WOLCOTT GIBBS,
JOHN TROWBRIDGE,
ERASMUS D. LEAVITT,
BENJAMIN O. PEIRCE,
EDWARD C. PICKERING,
CHARLES R. CROSS,
AMOS E. DOLBEAR.

C. M. Warren Committee.

FRANCIS H. STORER, SAMUEL CABOT,
THOMAS M. DROWN, HENRY B. HILL,
CHARLES L. JACKSON, LEONARD P. KINNICUTT,
ARTHUR M. COMEY.

Member of the Committee of Finance.

AUGUSTUS LOWELL.

The President appointed the following Standing Committees: —

Committee of Publication.

CHARLES L. JACKSON, WILLIAM G. FARLOW,
HORACE E. SCUDDER.

Committee on the Library.

BARRETT WENDELL, SAMUEL H. SCUDDER.
WILLIAM E. STORY,

Auditing Committee.

HENRY G. DENNY, AUGUSTUS LOWELL.

The following papers were presented by title: —

On the Occlusion of Gases by the Oxides of Metals. By Theodore William Richards and Elliot Folger Rogers.

On the Compound Acetates and Formiates of Cupriammonium. By Theodore W. Richards and Hubert Grover Shaw.

A Revision of the Atomic Weight of Barium. Second Paper: The Analysis of Baric Chloride. By Theodore William Richards.

The President appointed a Committee on the Custody of the Hall, consisting of the Recording Secretary, the Librarian, and Edward J. Young.

Eight hundred and sixtieth Meeting.

June 14, 1893. — MONTHLY MEETING.

The Academy met at the Physiological Lecture Room of the Harvard Medical School, Boston.

The PRESIDENT in the chair.

Harold C. Ernst explained the methods of investigation pursued in the study of bacteriology, illustrating his remarks with diagrams and lantern slides.

The attention of the Academy was then invited to an exhibit consisting of two main sections: —

1. Cultures of bacteria, including pathogenic and non-pathogenic organisms, in various nutrient media, each one, so far as possible, grown upon the standard media, in tube and plate culture, and the various cultures of the same organism grouped together and labelled with the common name; so that each one could be seen growing upon one or more of the following materials: nutrient gelatine (plain or with glycerine), nutrient agar-agar (plain or with glycerine), potato, bouillon, blood serum, milk, peptone, bread paste. Thus an opportunity was afforded for a comparative study of a number of varieties of bacteria under similar conditions.
2. Preparations placed under the microscope, showing the various appearances of the bacteria in tissues and in pure culture.

At the close of the lecture the President, after paying a just tribute to Dr. Ernst's interesting communication, proposed a vote of thanks, which was unanimously adopted.

Eight hundred and sixty-first Meeting.

October 11, 1893. — STATED MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read letters from J. Bryce, L. Hermann, and F. A. Kekulé, acknowledging their election as Foreign Honorary Members; from G. K. Gilbert and F. R. Hutton, acknowledging their election as Associate

Fellows; and from Sylvester R. Koehler, accepting Fellowship.

The following gentlemen were elected members of the Academy: —

Edward Salisbury Dana, of New Haven, to be an Associate Fellow in Class II., Section 1.

Samuel Louis Penfield, of New Haven, to be an Associate Fellow in Class II., Section 1, in place of the late Frederick A. Genth.

Jean Baptiste Édouard Bornet, of Paris, to be a Foreign Honorary Member in Class II., Section 2, in place of the late Alphonse L. P. P. de Candolle.

In accordance with the recommendation of the Committee on the Custody of the Hall, it was

Voted, To grant the use of the Hall of the Academy to the Colonial Society of Massachusetts on the third Wednesday of December, 1893, January, February, March, and April, 1894, after 3 o'clock P. M.

O. W. Huntington presented a paper entitled, "Further Observations upon the Occurrence of Diamonds in Meteorites."

On the motion of F. H. Storer, it was

Voted, That a Committee be appointed to consider changes in the statutes relating to the methods of electing officers.

On the motion of the Corresponding Secretary, it was

Voted, To meet on adjournment on the second Wednesday in November.

Eight hundred and sixty-second Meeting.

November 8, 1893. — ADJOURNED STATED MEETING.

The Academy met at the Engineering Building of the Massachusetts Institute of Technology, Boston.

The PRESIDENT in the chair.

The President announced the death of Moses Gerry Farmer, Resident Fellow, and of Benjamin Jowett, Foreign Honorary Member.

The Corresponding Secretary read letters from the Rumford Historical Association of Woburn, acknowledging the receipt of the bronze copy of the Rumford Medal presented by the Academy; from E. S. Dana and S. L. Penfield, acknowledging election as Associate Fellows; from the Anthropological Society of Washington, announcing the conditions of competition for its citizenship prizes; from the Natural History and Medical Society of Bonn, inviting the Academy to participate in its seventy-fifth anniversary festival; and from the Belgian Chemical Association, announcing an International Congress of Applied Chemistry, and inviting the Academy to send delegates.

The chairman of the C. M. Warren Committee made a brief report, recommending the appropriation of three hundred dollars to Charles F. Mabery for investigations on the American sulphur petroleums. This appropriation was voted by the Academy.

The President appointed a Committee on Methods of Electing Officers, consisting of the following gentlemen: Augustus Lowell, Chairman, F. H. Storer, Barrett Wendell, W. G. Farlow, and W. R. Livermore.

The Recording Secretary gave a brief account of the circumstances attending the award of the Massachusetts Charitable Mechanic Association's Grand Gold Medal at the exhibition in 1881 to Albert H. Emery. This medal, "for the exhibit most conducive to human welfare," was, at the request of the Association, bestowed by a committee of the Academy acting as judges.

Gaetano Lanza then explained and exhibited the Emery testing machine of 300,000 pounds' capacity, recently acquired by the Institute. This machine contains all the essential features of the 800,000 pounds testing machine built by Albert H. Emery, and now at the Watertown Arsenal.

The operation of this machine consisted in testing the compressive strength of a Virginia white-oak beam $13\frac{3}{8}$ inches × $8\frac{1}{4}$ inch × 15 feet, which failed when a load of 176,000 pounds was applied.

Cross Breaking. — The next experiment consisted in breaking a yellow-pine beam 17 feet 6 inches between the supports, weighing 617 pounds, and having a cross-section of 16½ inches × 6 inches. The load was in the centre, suspended from a yoke weighing 102 pounds.

A micrometer was placed on the beam, and the deflections were measured as follows: —

Loads.	Micrometer Readings.	Difference.
2,000	.05595	.24160
7,000	.29755	

The modulus of elasticity corresponding to these deflections was 1,778,200 pounds per square inch.

The beam broke by tension and longitudinal shear, at a load of 38,000 pounds.

The corresponding calculated modulus of rupture, including the weight of the beam, was 7,409 pounds per square inch.

The maximum intensity of longitudinal shear was 287.9 pounds per square inch.

Torsion Testing Machine. — A two-inch Norway iron shaft, 6 feet long between the holders, was twisted 16 turns without breaking. This specimen, left over night with a twisting moment on it of 76,680 inch pounds, broke the next morning; the maximum twisting moment being 82,080 inch pounds. The shaft increased $\frac{1}{32}$ of an inch in diameter.

Rope Testing Machine. — A Manila rope, 4¼ inches in circumference, 100 inches long, and held by two eye splices, broke at the centre under a load of 15,000 pounds. The rope stretched 24 inches before breaking.

The other machines and appliances on exhibition were as follows: —

The 150 horse-power triple expansion engine.

The 16 horse-power Harris-Corliss engine.

A rotary pump, a plunger pump, and a pulsometer.

In the department of hydraulics was seen the discharge through a circular orifice 1 inch in diameter in a thin plate.

The Blake duplex pump, having a steam cylinder 16 inches in diameter, a water cylinder, 10½ inches in diameter and 12-inch stroke, discharged water through three nozzles over a weir four feet wide.

The following paper was read by title: —

New Genera and Species of Laboulbeniaceæ, with a Synopsis of the Known Species. By Roland Thaxter.

Eight hundred and sixty-third Meeting.

January 10, 1894. — STATED MEETING.

The VICE-PRESIDENT in the chair.

The chair announced the death of Francis Parkman and Henry Warren Paine, Resident Fellows, and of Charles Merivale, Foreign Honorary Member.

The Corresponding Secretary read letters from W. K. Brooks, acknowledging his election as Associate Fellow; from E. Bornet, acknowledging his election as Foreign Honorary Member; and from the Corresponding Secretary of the Colonial Society of Massachusetts, thanking the Academy for affording the use of its Hall for the Society's meetings during the present season.

Barrett Wendell, on behalf of the Committee on Methods of Electing Officers, submitted a report.

On the motion of W. R. Livermore, it was

Voted, That this report be laid on the table.

The chairman of the Rumford Committee presented a report, and, in accordance with a recommendation contained therein, it was

Voted, To appropriate five hundred dollars from the income of the Rumford Fund to William H. Pickering for investigations on optical constants at different altitudes.

Granville Stanley Hall, of Worcester, was elected a Resident Fellow in Class III., Section 1.

C. L. Jackson read abstracts of the following papers: —

On the Formation of Volatile Compounds of Arsenic from Arsenical Wall Papers. By Charles R. Sanger.

Chronic Arsenical Poisoning from Wall Papers and Fabrics. By Charles R. Sanger.

Remarks on these papers were made by F. H. Storer, E. S. Wood, and W. G. Farlow.

The following papers were presented by title: —

On the Automorphic Linear Transformation of Bilinear Forms. By Henry Taber.

Contributions from the Gray Herbarium of Harvard University. By B. L. Robinson. I. Monograph of the North

American Alsineæ. II. New and hitherto imperfectly known Plants collected in Mexico by C. G. Pringle in 1892 and 1893. III. Notes upon the Genus Galinsoga.

On an Apparatus for the Measurement of Coefficients of Self-induction and the Investigation of the Phenomena of Alternating Currents. By Frank A. Laws. Presented by Charles R. Cross.

Eight hundred and sixty-fourth Meeting.

February 14, 1894. — MONTHLY MEETING.

The Academy met at the Walker Building of the Massachusetts Institute of Technology, Boston.

The PRESIDENT in the chair.

Elihu Thomson showed and described a number of phenomena produced by electrical discharges of high potential and of high frequency.

Work in this field began with Henry, and a considerable amount of experimentation in the same field has recently been carried on by Tesla, and others.

To obtain high frequency discharges, the current of an alternating current dynamo of 1,000 volts was reduced to 100 volts by suitable lighting transformers. This low pressure current was passed through the primary of a coil resembling a Ruhmkorff without break-piece, and raised to an alternating current of from 20,000 to 30,000 volts in the secondary, such current having still the original frequency of 120, that is 120 complete waves per second. This high pressure current was led directly into a large condenser, the metallic foils of which were insulated by a heavy mica sheet and contained in boxes filled with oil. The condenser, charged to 20,000 or 30,000 volts, in discharging jumped spaces or gaps between balls of brass through which spaces a strong air jet was kept blowing (Figure 1). The discharge circuit of the condenser includes these gaps, and may also include various coils, or plain wires, or paths designed to be traversed by the condenser discharge. If the condenser discharge takes place over a short path, of say only a few feet total length, the frequency or rate of alternation of the current composing the discharge may be several hundred thousand per second. This rate is so high that even a short length of conductor opposes the flow of current by its self-induction so greatly that lamps are lighted in a shunt to it, cards punctured, etc. (Figure 2). In fact, in one experiment an incandescent lamp was lighted in shunt to about 18 inches of ¼ inch copper rod, and the lamp was brought to full brilliancy (Figure 3). Moreover, it was distinctly shown that these currents are comparatively harmless, and may be passed through the body in an amount sufficient to light fully ordinary incandescent lamps (Figures 4 and 5); and the speaker stated that from the extremely small sensation experienced he thought it would be easily possible greatly to increase the current, and probably to an extent sufficient to light a small arc lamp.

The discharge circuit in this case had the form of a U of heavy copper rod, and it could be grasped so as to short-circuit it between points of such potential that insulation of considerable thickness would be readily pierced; but there was no disagreeable sensation, and very little sensation at all experienced.

The extraordinary energy of the induction of these discharges in the U-shaped conductor was shown by bringing near to it a rectangle of heavy copper wire the circuit of which was completed through a large incandescent lamp requiring more than one third of a horse-power of electrical energy to light it. It was found that the incandescent lamp could be brought far beyond its normal brilliancy on placing the rectangle a few inches away from the U (Figures 6 and 7).

By causing the condenser discharges to pass the air gaps and also a large open coil of about ten turns immersed in oil, the inductive effects of such coil on a parallel secondary coil having about 460 turns were exhibited. This secondary coil of 460 turns was wound on a hard rubber frame as a single layer, and the turns kept apart by a small space, and together with the primary immersed in a box or bath of oil of high insulating power (Figure 8). The ends of the finer and longer secondary were carried to the terminals rising out of the oil at the ends of the box or bath, and between these terminals torrents of sparks of about 30 inches in length were produced, accompanied by a loud roaring or crashing sound. Lateral discharges from the terminals were shown to be capable of being received through the body without injury, although of sufficient energy of current to light fully an incandescent lamp (Figure 9), and in fact to melt off the ends of fine wires, set fire to sticks of wood, etc. In this connection it was shown also that water was for these discharges a comparatively fair insulator, inasmuch as the sparks could be made to pass under water with substantially the same appearance as when they passed through air. Disruptive sparks as well as brush discharges were produced under water.

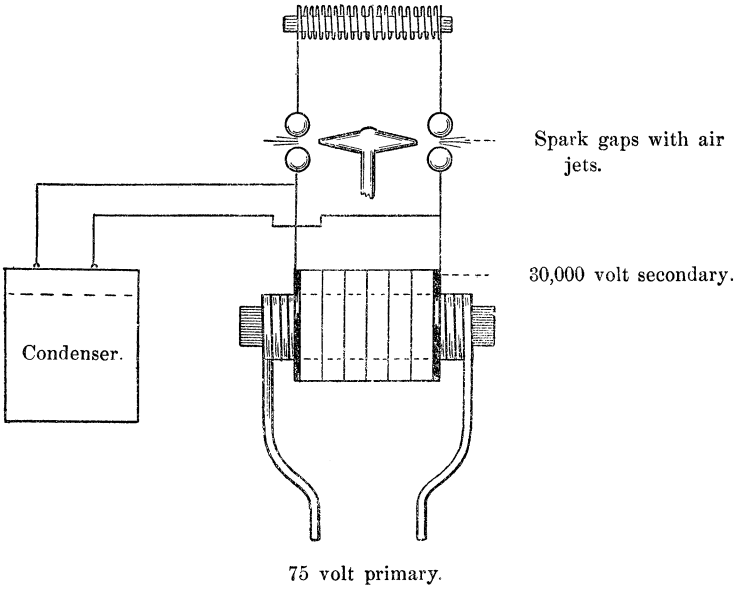


Fig. 1.
High frequency circuit.

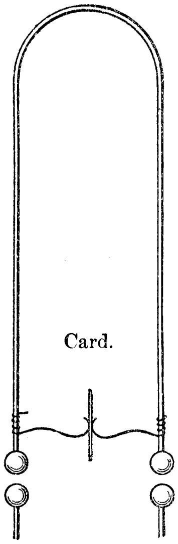


Fig. 2.
High frequency loop,
with shunt puncturing card.

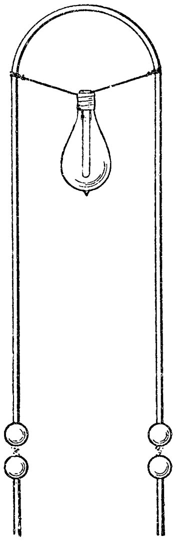
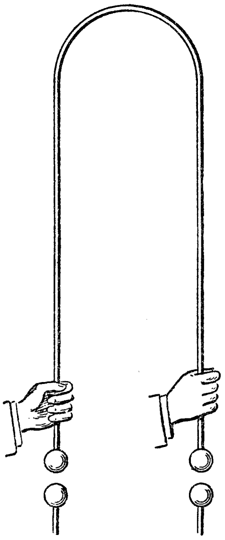


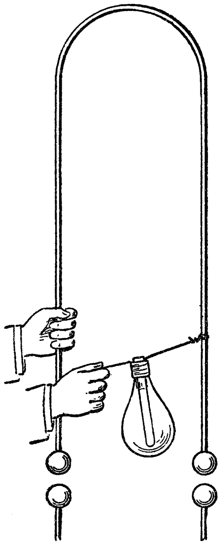
Fig. 3.
High frequency loop,
shunted by lamp.

Fig. 4.



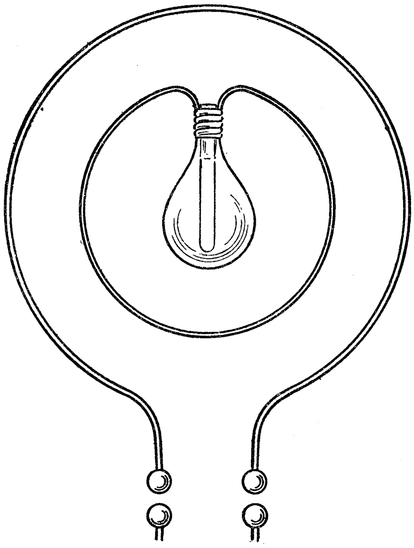
High frequency loop,
shunted by person.

Fig. 5.



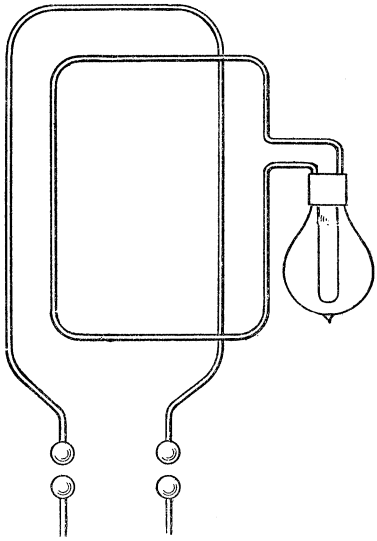
High frequency loop,
shunted by lamp and person.

Fig. 6.



High frequency round loop,
with circular turn and lamp lighted inductively.

Fig. 7.



High frequency loop, induction into adjacent circuit or loop, with large lamp between terminals thereof.

Fig. 8.

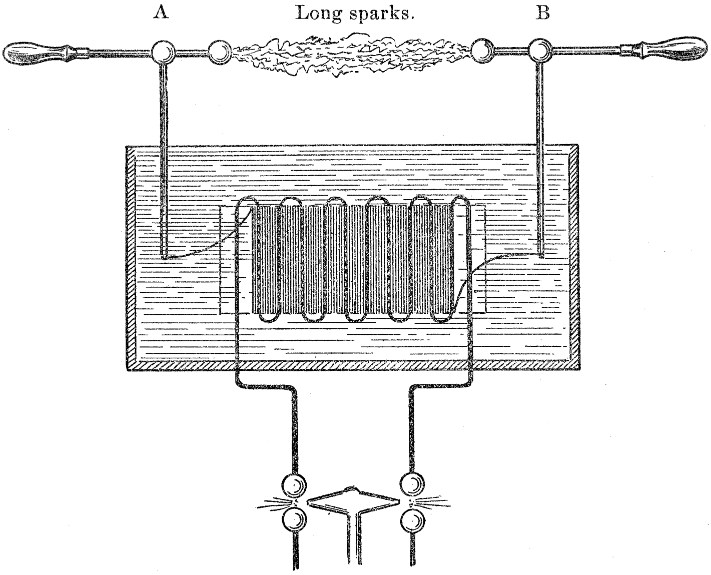
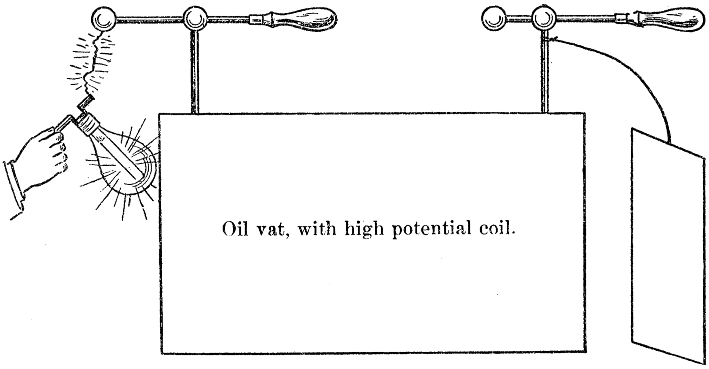


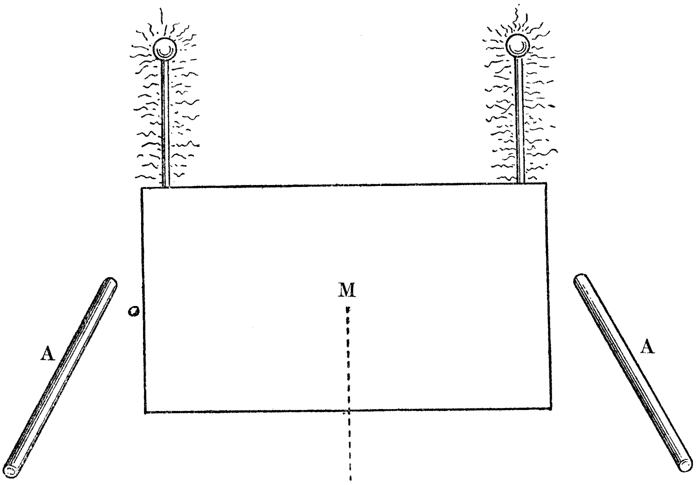
Diagram of vat with oil, immersed in which is the high frequency primary of few turns with secondary of a layer of finer wire of relatively 30 to 40 times the primary turns. Sparks obtained from prolongations of secondary outward or discharge terminals, A, B.

Fig. 9.



Lamp lighted by sparks from one terminal. Discharge traversing person's body.

Fig. 10.



Geissler tube, *a*, lighted by electrostatic field except at neutral position, *m*.

As exhibiting the electrostatic activity of the rapidly alternating electrostatic field around the apparatus, a long Geissler tube without metallic terminals was used, and brilliantly illuminated even at distances several feet away from the outside of the vat containing the induction apparatus. The tube, however, failed to light in one position; that is, in the centre plane dividing the apparatus into halves, which during action are electrified respectively positively and negatively at each alternation (Figure 10).

At the close of the experiments a vote of thanks was extended to the speaker.

S. H. Scudder exhibited a medal struck to celebrate the one hundredth anniversary of the birthday of Chevreul.

C. L. Jackson presented the following papers by title: —

On Mucophenoxychloric Acid. By H. E. Sawyer.

On Certain Bromine Derivatives of Resorcine. By C. L. Jackson and F. L. Dunlap.

The Smithville Meteoric Iron. By Oliver W. Huntington.

Eight hundred and sixty-fifth Meeting.

March 14, 1894. — STATED MEETING.

The PRESIDENT in the chair.

The chair announced the death of Pierre J. Van Beneden and of Sir James Fitzjames Stephen, Foreign Honorary Members.

The Corresponding Secretary read the following letters: from Edouard Van Beneden, announcing the death of his father, P. J. Van Beneden; from the Council of the Scientific Alliance of New York, calling attention to the proposed establishment of a fund for the endowment of research in honor of the late John Strong Newberry, and soliciting subscriptions thereto; from the Royal Academy of Physical and Mathematical Science of Naples, announcing a prize of 1,000 lire for the best memoir on prime numbers; also from the Executive Committee of the Eighth International Congress of Hygiene and Demography, and from the Tenth International Congress of Orientalists, inviting the Academy to take part in the work of those Congresses.

On the motion of C. S. Minot, it was

Voted, That the President be authorized to appoint delegates to either or both of these Congresses.

The following gentlemen were elected members of the Academy: —

Francis Mathews Green, of Boston, to be a Resident Fellow in Class I., Section 2.

Wallace Clement Sabine, of Cambridge, to be a Resident Fellow in Class I., Section 3.

John Donnell Smith, of Baltimore, to be an Associate Fellow in Class II., Section 2, in place of the late George Vasey.

The chairman of the C. M. Warren Committee presented a report, and, in accordance with a recommendation contained therein, it was

Voted, To appropriate from the income of the C. M. Warren Fund the sum of two hundred dollars ($200) to aid Charles F. Mabery, of Cleveland, Ohio, in making a systematic study of the petroleums of Ohio and Canada, with especial reference to the separation of the individual hydrocarbons therein contained.

On the motion of S. H. Scudder, it was

Voted, To take from the table the report of the Committee on Methods of Electing Officers.

A protracted discussion ensued, in which W. R. Livermore, A. Lowell, F. H. Storer, C. R. Cross, S. C. Chandler, C. S. Minot, H. W. Williams, S. H. Scudder, A. Hyatt, and G. Hay took part.

On the motion of A. Lowell, it was

Voted, That it be the duty of the Council annually to prepare a list of candidates for the offices of President, Vice-President, Corresponding Secretary, Recording Secretary, Treasurer, Librarian, Councillors, and members of the Standing Committees, and to cause this list to be sent by mail to all the Resident Fellows of the Academy three weeks before the Annual Meeting. Whenever the Council shall receive a nomination for any office, signed by not less than ten of the Resident Fellows of the Academy, it shall be the duty of the Council to publish such nomination with its own.

On the motion of the Corresponding Secretary, it was

Voted, To meet on adjournment on the second Wednesday in April.

The following paper was presented by title: —

On the Inheritance of Acquired Characters in Animals with a Complete Metamorphosis. By A. S. Packard.

Eight hundred and sixty-sixth Meeting.

April 11, 1894. — ADJOURNED STATED MEETING.

The Academy met at the Walker Building of the Massachusetts Institute of Technology, Boston.

The PRESIDENT in the chair.

The chair announced the death of Charles E. Brown-Séquard, of Paris, a Foreign Honorary Member.

On the motion of John Trowbridge, on behalf of the Rumford Committee, it was

Voted, To appropriate from the income of the Rumford Fund the sum of three hundred dollars ($300) to F. A. Laws in aid of his investigations on the thermal conductivity of metals.

Voted, To appropriate from the income of the Rumford Fund the sum of one thousand dollars ($1,000) to be expended in aid of investigations in light and heat. Payments from this sum to be made on the order of the Chairman of the Committee.

On motion of the Corresponding Secretary, it was

Voted, That the Committee of Publication be authorized to use for illustrations a portion of the regular annual appropriation for publications not exceeding fifty dollars ($50) for each paper. Larger appropriations of money from the general funds for illustrations to be made only by vote of the Academy at a stated meeting, on recommendation of the Committee of Publication, approved by the Treasurer.

The Corresponding Secretary gave notice of a proposed change in the statutes: to amend Chapter IV. of the Statutes by changing the numbers of Sections 4, 5, and 6, to 5, 6, and 7, respectively, and to insert a new section as follows: —

"4. The C. M. Warren Committee, of seven Fellows, to be chosen by ballot, who shall consider and report on all applications for appropriations from the income of the C. M. Warren Fund, and generally see to the due and proper execution of this trust."

On the motion of the Corresponding Secretary, it was

Voted, To refer this proposed change in the Statutes to a committee.

The President appointed the Recording Secretary as this committee.

On motion of the Librarian, it was

Voted, To present a copy of the Life and Works of Count Rumford, published by the American Academy, to the Rumford Kitchen.

The following papers were read by title: —

Further New and imperfectly known Plants collected in Mexico by C. G. Pringle in the Summer of 1893. By B. L. Robinson and J. M. Greenman.

On the Determination of Sulphur in Volatile Organic Compounds. By Charles F. Mabery.

Edward C. Pickering described the work in astronomical photography of the Harvard College Observatory.

Photographs were thrown upon the screen, some of which illustrated the following subjects: — The two principal stations of the Observatory at Cambridge and at Arequipa. Photographs of the double star ζ Ursæ Majoris, the planet Saturn showing its ring, and the occultation of a star by the Moon, taken by George P. Bond in 1857. Various members of the solar system, including Venus as a crescent, Vesta showing the method of discovering asteroids by photography, Jupiter, Saturn, Neptune and its satellite. Swift's comet of 1892. An eclipse of Jupiter's satellite. Eclipsed Moon, showing the method of searching for a lunar satellite. Photographs of the Moon taken at the Harvard station in Southern California, enlarging the image in the telescope; the results were compared with those obtained elsewhere. Great spiral Nebula in Orion, invisible to the eye, but covering a large part of that constellation. Method employed at Arequipa for making the 13-inch Boyden telescope follow the apparent motion of a star. Instead of a finder, images in the photographic telescope are used. The telescope is made to follow a star by means of an eyepiece outside of the photographic field. The entire plate is free to rotate around this eyepiece as an axis. The plate is then turned at intervals so that another star is kept in the axis of a second eyepiece. Sources of error, such as variations in flexure, in refraction, and in adjustment of the polar axis, which cannot be eliminated by the ordinary method with a finder, are thus corrected. Photographs of the clusters κ Crucis, ω Centauri, and 47 Tucanæ. Chart and spectrum plates of the vicinity of the variable star η Carinæ, showing stars of the fifth type and other objects having peculiar spectra. Distribution of stars of the fifth type. Identity of the spectra of α Aurigæ and the Sun. Spectrum of β Aurigæ, showing the lines single and double. Spectrum of a new variable star in Scorpius, showing the method of discovering variable stars of long period by means of the bright hydrogen lines in their spectra. Charts showing this star bright and faint. Light curve of this and of other variables. Spectrum plates showing the presence and absence of the new star in Norma. Charts showing the absence of this star before July, 1893, and its presence since then. Identity of the spectra of Nova Normæ and Nova Aurigæ. Spectra of Nova Aurigæ and o Ceti, showing the difference between the spectra of new stars and variable stars of long period. Method of detecting by inspection stars having a large parallax, proper motion, or variation in light; pairs of photographs are taken at intervals of six months, with the film side of the plate out and in; superposing plates taken six months apart in opposite positions so that the gelatine films are in contact, small deviations are perceptible; a motion corresponding to a parallax of $0''.6$ was thus readily visible across the room.